

CLAIM AMENDMENTS

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims

1. (Currently Amended) A method of provisioning support for Virtual Private Network (VPN) services, centrally, in a network management context, the method comprising the steps of:

a.—establishing a full transport mesh of bidirectional Label Switched Paths (LSPs) between a plurality of managed Provider Edge (PE) communications network nodes in a managed communications network, the step of establishing the full transport mesh comprising:

selecting a group of PE communications network nodes participating in the managed communications network, each PE communications network node comprising a Label Switched Router (LSR),

deriving a corresponding plurality of PE communications network node pairs from the selected group of PE communications network nodes, and

issuing LSP commissioning commands to each PE communications network node in the group to establish an LSP in respect of each corresponding PE communications network node pair;

b.—establishing a full signaling mesh of targeted Label Distribution Protocol (LDP) signaling sessions between the plurality of PE communications network nodes; and

e.—removing a PE communications network node from the group, the step of removing the PE communications network node comprising:

selecting at least one provisioned LSP terminating at the PE communications network node to be removed,

determining two PE communications network nodes corresponding to ends of the at least one selected LSP,

determining whether content is being conveyed via the at least one selected LSP in respect of at least one actively provisioned VPN service,

selectively issuing LSP decommissioning commands to the two PE communications network nodes corresponding to the ends of the at least one selected LSP when a determination is made that no content is being conveyed through the at least one selected LSP, and

excluding the PE communications network node from the group if all selected LSPs have been decommissioned.

2. (Canceled)

3. (Currently Amended) The method claimed in ~~claim 2~~ claim 1, wherein prior to issuing LSP commissioning commands, the method further comprises steps of:

a.—determining whether a managed LSP already exists between a pair of PE communications network nodes in the group;

b.—determining whether a provisioning parameter associated with the already-existing ~~discovered~~-LSP complies with a corresponding transport mesh provisioning parameter; and

~~e.~~ conditionally including the already-existing discovered LSP in the transport mesh if compliance exists.

4. (Currently Amended) The method claimed in ~~claim 2~~ claim 1, wherein commissioning an additional LSP, the method further comprises steps of:

- ~~a.~~ selecting a pair of PE communications network nodes from the group; and
- ~~b.~~ issuing LSP commissioning commands to each PE communications network node in the pair to establish the additional LSP therebetween.

5. (Canceled)

6. (Currently Amended) The method claimed in claim 1, ~~claim 2~~, wherein ~~adding a PE communications network node to the group, the method further comprises steps of: the method further comprising a step of adding an additional PE communications network node to the group, the step of adding the additional PE communications network node comprising:~~

~~a.~~ deriving a plurality of PE communications network node pairs, each pair including the additional PE communications network node and one of the PE communications network nodes in the group; and

~~b.~~ issuing LSP commissioning commands to the additional PE communications network node and each PE communications network node in the group, to establish an LSP corresponding to each derived PE communications network node pair ~~determined~~.

7. (Canceled)

8. (Currently Amended) The method claimed in claim 1, wherein the step of establishing the full transport mesh further comprises establishing the full signaling mesh, the method further comprises steps of:

—— a. ~~selecting a group of PE communications network nodes participating in the managed communications network;~~

—— b. ~~deriving a corresponding plurality of PE communications network node pairs from the selected group of PE communications network nodes; and~~

—— c. issuing targeted LDP session commissioning commands to each PE communications network node in the group to establish a targeted LDP session in respect of each corresponding PE communications network node pair.

9. (Currently Amended) The method claimed in claim 8, wherein prior to issuing targeted LDP commissioning commands, the method further comprises steps of:

a. determining whether a managed targeted LDP session already exists between a pair of PE communications network nodes in the group; and

b. including the already-existing ~~discovered~~ targeted LDP session in the signaling mesh.

10. (Currently Amended) The method claimed in claim 8, wherein the step of issuing targeted LDP commission commands further comprises: commissioning an additional targeted LDP session, the method further comprises steps of:

- a. selecting a pair of PE communications network nodes from the group;
- b. optionally selecting a corresponding pair of interfaces, each interface being associated with a respective PE communication network node in the pair; and
- e. issuing targeted LDP session commissioning commands to each PE communications network node in the pair to establish the additional targeted LDP session therebetween.

11. (Currently Amended) The method claimed in claim 8, further comprising a step of wherein decommissioning a selected targeted LDP session, the step of decommissioning comprising method further comprises steps of:

- a. determining the two PE communications network nodes corresponding to the ends of the selected targeted LDP session;
- b. determining whether signaling information is being conveyed via the selected targeted LDP session in respect of at least one actively provisioned VPN service; and
- e. selectively issuing targeted LDP session decommissioning commands to the two PE communications network end nodes when a determination is made that no signaling information is being conveyed via the selected targeted LDP session.

12. (Currently Amended) The method claimed in claim 8, ~~wherein further comprising a step of adding an additional adding a PE communications network node to the group, the step of adding the additional PE communications network node comprising the method further comprises~~ steps of:

a. deriving a plurality of PE communications network node pairs, each pair including the additional PE communications network node and one of the PE communications network nodes in the group; and

b. issuing targeted LDP session commissioning commands to the additional PE communications network node and each PE communications network node in the group, to establish a targeted LDP session corresponding to each derived PE communications network node pair ~~determined~~.

13. (Canceled)

14. (Currently Amended) A method of provisioning support for Virtual Private Network (VPN) services, centrally, in a network management context, the method comprising the steps of:

a. establishing a full transport mesh of bidirectional Label Switched Paths (LSPs) between a plurality of managed Provider Edge (PE) communications network nodes in a managed communications network, the step of establishing the full transport mesh comprising:

selecting a group of PE communications network nodes participating in the managed communications network, each PE communications network node comprising a Label Switched Router (LSR),

deriving a corresponding plurality of PE communications network node pairs from the selected group of PE communications network nodes, and

issuing LSP commissioning commands to each PE communications network node in the group to establish an LSP in respect of each corresponding PE communications network node pair;

~~b.-~~establishing a full signaling mesh of targeted Label Distribution Protocol (LDP) signaling sessions between the plurality of PE communications network nodes; ~~and~~

~~e.-~~ascribing an identifier identified to one of: a transport mesh of LSPs, and a signaling mesh of targeted LDP sessions; and

removing a PE communications network node from the group, the step of removing the PE communications network node comprising:

selecting at least one provisioned LSP terminating at the PE communications network node to be removed,

determining two PE communications network nodes corresponding to ends of the at least one selected LSP,

determining whether content is being conveyed via the at least one selected LSP in respect of at least one actively provisioned VPN service,

selectively issuing LSP decommissioning commands to the two PE communications network nodes corresponding to the ends of the at least one selected LSP when a determination is made that no content is being conveyed through the at least one selected LSP, and

excluding the PE communications network node from the group if all selected LSPs have been decommissioned.

15. (Original) The method claimed in claim 14, further comprising a step of: tracking one of: a transport mesh and a signaling mesh in a network management system repository.

16. (Currently Amended) A network management system centrally provisioning full mesh MultiProtocol Label Switching (MPLS) connectivity in a managed communications network in support of Virtual Private Network (VPN) service provisioning, the network management system comprising:

a.—a network management system repository tracking managed Provider Edge (PE) communications network nodes in the managed communications network;

b.—a full content transport Label Switched Path (LSP) mesh configuration and provisioning means for managing a plurality of content transport LSPs between a selected group of managed PE communications network ~~nodes~~; nodes, the means for managing comprising:

means for deriving a corresponding plurality of PE communications network node pairs from the selected group of PE communications network nodes, and

means for issuing LSP commissioning commands to each PE communications network node in the group to establish an LSP in respect of each corresponding PE communications network node pair;

e.—a full targeted Label Distribution Protocol (LDP) signaling session mesh configuration and provisioning means for managing a plurality of targeted LDP signaling sessions between the selected group of PE communications network nodes; and

d.—a PE communications network node removing means for removing a PE communications network node from the selected group, the removing means comprising:

means for selecting at least one provisioned LSP terminating at the PE communications network node to be removed,

means for determining two PE communications network nodes corresponding to ends of the at least one selected LSP,

means for determining whether content is being conveyed via the at least one selected LSP in respect of at least one actively provisioned VPN service,

means for selectively issuing LSP decommissioning commands to the two PE communications network nodes corresponding to the ends of the at least one selected LSP when a determination is made that no content is being conveyed through the at least one selected LSP, and

means for excluding the PE communications network node from the group if all selected LSPs have been decommissioned.

17. (Original) The network management system claimed in claim 16, wherein each PE communications network node in the group of managed PE communications network nodes comprises a Label Switching Router (LSR).

18. (Original) The network management system claimed in claim 16, wherein the full content transport LSP mesh configuration and provisioning means comprises a human-machine-interface.

19. (Original) The network management system claimed in claim 16, wherein the full targeted LDP signaling session mesh configuration and provisioning means comprises a human-machine interface.

20. (Original) The network management system claimed in claim 16, further comprising one of: managed PE communications network node filtering means, and managed PE communications network node pair selection means.

21. (Original) The network management system claimed in claim 16, further comprising one of: LSP discovery means, targeted LDP session discovery means, and LSP parameter comparison means.